

VARIABLE STAR SECTION.

CIRCULAR No. 164.

FN SAGITTARII.

Frank M. Bateson.

SUMMARY: Visual estimates, in steps, are listed for FN Sgr for interval J.D. 2,435,638 to 2,440,918. This star shows a continuous small variation superimposed on larger semi-regular variations, for which there appears to be periods of around 400 and 1,000 days. A plot of the larger variations based on 50 day means is reproduced.

FN Sgr is a symbiotic variable of class Z And. Dates of primary maxima and minima are given.

.....

INTRODUCTION: FN Sgr had a maximum of about 9.0 ptg on J.D. 2,424,244 (1) and Cecilia H. Payne stated its curve "recalls that of a nova although the range is unusually small." Herbig (2) showed that three spectrograms, taken when the variable was near visual magnitude 13, had a bright line spectrum on a weak continuum. He also noted that small variations in light were still taking place. C. Payne-Gaposchkin (3) when investigating Harvard Milton Field 43 classified FN Sgr as a nova with range 8.5 to 13.5 ptg, adding that "our measures have not added to the information on this star."

The G.C.V.S. (4) notes that FN Sgr resembles Z And and outbursts were observed in 1924-26 and 1936-41. It has a composite spectrum with bright lines, perhaps earlier than B.

CHARTS & SEQUENCE: Charts 105 & 106 (5) give Harvard photometric magnitudes for the surrounding stars down to magnitude 11.0 with comparison stars designated by letters. Beljawsky (6) gives approximate photographic magnitudes for these stars.

The sequence used by V.S.S., RASNZ as shown on chart 106 is:-

<u>CHART LETTER</u>	<u>STAR</u>	<u>PTG. MAG.</u>	<u>STEP VALUES.</u>
f	CPD -19° 7202	9.7	...
h	-19 7200	10.7	0
k	-19 7178	11.1	5
m	-19 7176	11.5	9
p	...	12.3	13
q	17
r	...	13.1	23
t	...	13.5	26

The final column above gives the step estimates derived from visual observations by A.F. Jones. In the absence of reliable V magnitudes these step estimates have been used to reduce the observations made by members of this section.

OBSERVATIONS: Visual observations cover the interval 2,435,638 (1956 June 13) to 2,440,918 (1970 Nov. 27). The individual observations, reduced to step values, are given in Table 1 with observers' abbreviations omitted.

The normal observing season for FN Sgr is April through October with a few observations in February, March and November. No observations are possible in January and December

V.S.S. CIRCULAR No. 164 (cont).

because the region is too close to the Sun. In some years, especially 1962 to 1967 inclusive, FN Sgr has not been as well observed as in other years.

DISCUSSION: A plot of the individual observations shows that, when FN Sgr has been consistently observed, there is a continuous small variation. These fluctuations are superimposed on larger variations. Whilst at first glance the variations appear to be completely irregular there is evidence for semi-regular changes with periods of about 400 and 1,000 days.

When the observations are grouped into fifty day means the larger variations of a semi-regular nature become more evident despite periods of "standstills". Figures 1 and 2 show the plots from 50-day means. In both figures the numeral below each point shows the number of observations used to form the mean. Inspection of the Figures shows the gaps in the records when no observations were made.

FN Sgr was 10 steps, or brighter on:-

J.D. 2,437,083; 2,438,185; 2,438,630; 2,440,180.

Primary minima of 28 steps or fainter were observed on 2,436,015 and 2,439,578 and 2,440,052. Single estimates suggest other primary minima around 2,437,934 and 2,438,315.

Other secondary maxima and minima are apparent. It can be assumed that primary minima correspond to a visual magnitude of just below 13.0. This would place the primary maxima around a visual magnitude of 10.8.

Photoelectric observations are required since FN Sgr is presumably binary in view of its spectrum and reliable measures of the small fluctuations should be interesting.

ACKNOWLEDGEMENTS: Observations were made by G.W. Christie; A. Crompton; K. Hunter; S.R. Hovell; A.F. Jones; M.V. Jones; S.C. McMillan; B. Menzies; B.F. Marino; V.L. Matchett; W.S.G. Walker and the author. To all these observers I am indebted and especially to A.F. Jones for the earlier records and to M.V. Jones for his very consistent following of this star in more recent years.

1971 January 6

18 Pooles Road,
GREERTON.
TAURANGA.
NEW ZEALAND.

REFERENCES:

- (1) 1928. Payne, Cecilia H. H.B. 861, p.8
- (2) 1950. Herbig, G.H. P.A.S.P., 62,368, p. 215.
- (3) 1950. Payne-Gaposchkin, C. H.A. 115, 12.
- (4) 1970. Kukarkin, B.V. et al. General Catalogue of Variable Stars, Ast. Council, Academy of Sciences in U.S.S.R., Moscow.
- (5) 1968. Bateson, F.M., Jones, A.F. & Stranson, I. "Charts for Southern Variables" Series 4. Published by F.M. Bateson.
- (6) 1927 Beljawsky, J. A.N. 230, 153.

TABLE 1.

FN SAGITTARII--OBSERVATIONS.

<u>J.D.</u>	<u>STEPS.</u>	<u>JD.</u>	<u>STEPS.</u>	<u>JD.</u>	<u>STEPS.</u>	<u>JD.</u>	<u>STEPS.</u>	<u>JD.</u>	<u>STEPS.</u>	<u>JD.</u>	<u>STEPS.</u>
2,435,000 +		2,436,000 +		2,437,000 +	2,439,000 +			2,440,000 +			
639	18	509	22	410	<17	275	15	121	8	533	<17
640	16	513	22	441	18	291	16	123	9	534	20
641	14	610	<23	456	17	327	15	123	9	535	20
650	17	622	<13	465	16	354	18	124	12	536	20
651	16	634	25	475	18	415	19	124	8	538	<17
655	16	662	18	489	21	567	24	125	< 5	736	11
667	17	680	15	522	16	599	32	128	9	739	11
682	18	690	16	529	18	651	18	129	13	744	17
688	20	699	12	541	17	661	16	130	10	766	17
695	18	708	11	554	14	683	12	133	10	767	17
701	21	711	18	570	13	709	13	134	8	768	17
713	18	716	17	576	12	716	13	161	8	769	19
717	18	722	15	587	16	739	12	164	8	770	17
726	20	733	17	607	17	764	18	173	10	771	16
740	20	736	18	615	17	787	16	178	8	772	17
771	18	738	14	739	24	796	17	178	11	773	18
791	<13	749	15	762	24	917	18	276	10	775	13
898	21	759	15	793	24	940	<23	296	12	779	17
929	24	764	16	825	24	943	18	317	12	780	17
938	<13	778	16	831	24	974	<26	317	11	781	17
969	28	785	16	847	29	975	23	338	26?	782	17
970	24	791	17	857	22	975	18	338	15	789	18
983	28	803	17	867	24	976	22	338	13	790	17
989	27	807	16	883	25	988	<17	338	15	791	17
997	27	811	18	902	22	995	< 9	338	13	792	17
2,436,000 +		818	18	933	28	2,440,000 +	354	< 9		793	17
010	28	831	16	2,438,000 +	001	<17	366	12		793	17
012	< 26	838	18	123	24	003	<23	367	15	794	17
022	28	846	18	144	12	007	<13	369	17	796	17
026	28	872	18	169	11	008	<23	376	16	797	17
043	26	880	19	181	4	009	31	378	17	798	17
047	25	893	14	208	13	017	<17	405	16	799	18
052	26	989	22	237	12	017	<23	440	15	800	17
073	29	2,437,000 +	255	14	031	<23	450	13		801	18
077	25	003	<17	267	13	041	30	452	19	802	17
081	24	033	23	290	17	056	27	454	16	803	17
096	25	060	12	315	30	057	32	459	13	804	17
107	24	076	13	536	22	065	<17	464	9?	805	17
110	22	081	11	557	20	067	24	464	17	817	17
127	22	090	7	596	14	078	22	465	21	818	17
134	22	100	9	637	11	078	22	466	22	819	18
142	18	112	8	650	9	082	21	467	21	820	17
159	16	116	12	667	15	083	19	468	21	821	17 18
245	<13	120	10	679	11	084	20	469	19	823	17
286	23	129	12	695	9	085	19	470	22	826	17
308	21	138	13	710	12	087	17	472	21	830	15
313	22	146	12	806	16	088	20	480	21	832	18
340	23	159	14	826	21	089	20	481	22	833	18
343	<23	167	21	883	26	090	19	482	18	834	18
353	22	176	24	892	28	091	18	493	21	836	17
365	22	199	25	976	23	092	16	494	21	837	17
374	24	216	25	2,439,000 +	093	18	495	23		854	14
382	21	231	16	002	24	094	17	498	21	864	9
398	23	250	18	030	14	096	12	499	20	881	18
411	22	258	16	055	17	099	<17	500	21	890	18
421	23	350	18	204	14	101	12	501	<17	891	18
429	24	372	16	235	13	109	16	505	21	892	17
450	25	384	16	240	14	116	18	517	<17	893	18
458	24	401	16	266	12	118	12	524	22	900	<13
466	24									913	18

FIGURE 1.

FN Sagittarii---Plot of 50-day Means.

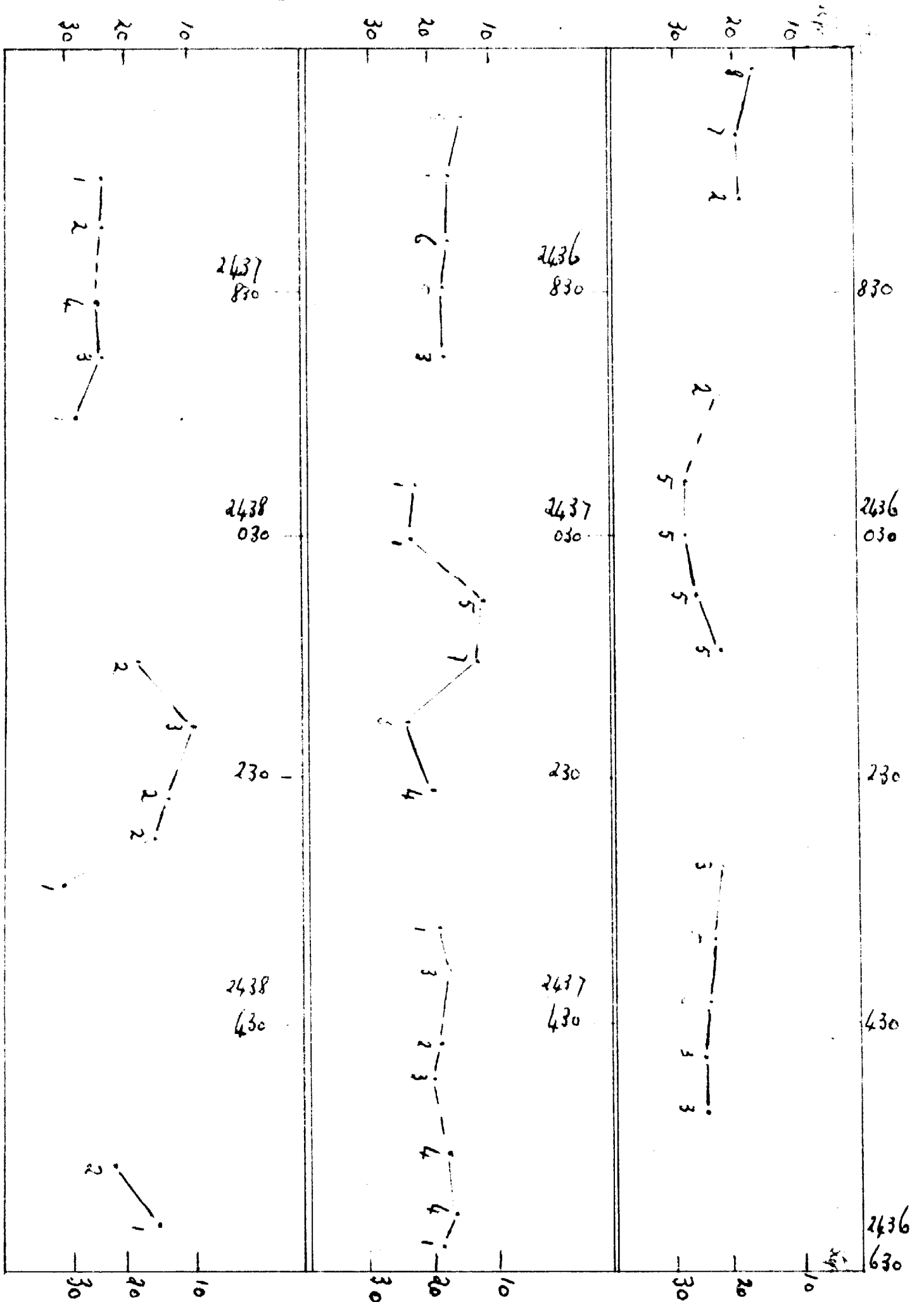


FIGURE 2.

FN SAGITTARII--PLOT of 50-day Means (cont).

